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Docket No.: 1340-023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT OPERATIONS

In re Application of:)
)
Giovanni Cariolato) Group Art Unit: --
)
Serial No.: 10/800,557) Examiner: --
)
Filed: March 15, 2003)
)

For: **DISPLAY SCREEN STRUCTURE AND METHOD OF FORMING THE SAME**

New York, NY 10036
August 10, 2004

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CLAIM FOR CONVENTION PRIORITY UNDER 35 U.S.C. §119

SIR:


In the matter of the above-identified application and under the provisions of 35

U.S.C. §119 Inventor(s) claim the benefit of the following prior applications:

Application(s) filed in : United Kingdom
In the name of Applicant(s) : **Giovanni Cariolato**
Application No(s). : 0306337.7
Filed : March 20, 2003

Pursuant to the Claim to Priority, Applicant(s) submit duly certified copy of said foreign application.

Respectfully submitted,



James V. Costigan
Registration No. 25,669

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:

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on : August 10, 2004


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INVESTOR IN PEOPLE

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I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Controller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

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Dated 7 July 2004



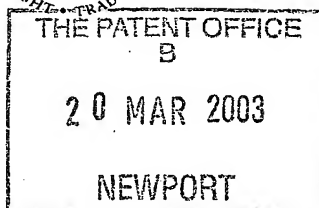
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The Patent Office

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Request for grant of a patent

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1. Your reference

GW-G33190

2. Patent application number

(The Patent Office will fill in this part)

20 MAR 2003

20 MAR 03 07:33:48 - Z 000346
P01/7700 0.00-0306337.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Global Display Solutions Limited
Emco House
Cottingley Business Park
Bradford
BD16 1PF

0306337.7

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

England

85591430001

4. Title of the invention

Improvements to a Display Screen Structure

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Bailey Walsh & Co
5 York Place
Leeds
LS1 2SD

Patents ADP number (if you know it)

224001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Yes

Patent Form 1/77

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Continuation sheets of this form

Description 8

Claim(s)

Abstract

Drawing(s) 2 + 2

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10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents
(*please specify*)

11. I/We request the grant of a patent on the basis of this application.

Signature

G Wood

Date

19.03.03

12. Name and daytime telephone number of person to contact in the United Kingdom

G Wood
0113 243 3824

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Improvements to a Display Screen Structure

The invention which is the subject of this application is an improvement to a display screen structure and particularly, although not necessarily exclusively, to a screen structure of the type which includes a flat screen and a protective panel positioned in front of the same.

Display screens can be provided in many sizes and indeed shapes and can be put to many different uses. In certain environments, typically where the screens are put to commercial use as part of commercial products and/or as part of products used in environments where there is a risk of damage, the screens are provided with a protective panel positioned in front of the display screen to lie between the display screen and the person viewing the display. These panels can be made from a suitable transparent material such as glass or acrylic. These panels serve to protect or minimise the screen from impact damage due to accidental contact if, for example, the screen is in use in industrial or maritime environments and/or malicious damage due to vandalism if, for example, the display screen is used as part of an information installation or as part of an automated telling machine (ATM).

One problem which is known is that the provision of the protective panel can cause difficulty to the viewer of the material on the display screen due to the properties of refraction between the protective panel, the display screen and, if provided, an air gap between the panel and the display screen. This can cause the material to be almost illegible and hence of very little practical benefit to the person viewing the display. A further problem is that the provision of the protective panel means that the front of the display screen, typically a Liquid Crystal Display (LCD) screen can be difficult to cool and hence

cause overheating of the display screen or at least require more expensive cooling means than desired to be provided.

In some instances it is known to try and reduce the problems caused by refraction by minimising the air gap between the protective panel and the display screen. However, problems still exist in the viewing of the material displayed on the display screen due to the problems of loss of contrast when the material on the screen is being viewed through the air gap which is still present between the display screen and protective panel and possible internal reflection.

It should be noted that reference hereonin to a protective panel includes the provision of a touch screen panel, the main purpose of which is to act as a means for interaction with the screen rather than a purely protective function and the reference to a protective panel throughout the description is in a non-limiting manner.

The aim of the present invention is to provide a display screen structure of a type which maintains or improves the resistance to damage of the display screen by the provision of a protective panel and also solves or minimises the problems caused by refraction, reflection and contrast which exist in the conventional screens with such protective panels.

In a first aspect of the invention there is provided a display screen structure, said structure including a display screen, a protective panel positioned in front of the display screen and allowing the viewing of material on the display screen therethrough and wherein there is provided between the inner face of the protective panel and the display screen, a layer of filler material which is substantially transparent to allow the

material on the display screen to be viewed through the layer of filler material and the panel.

In one embodiment the filler material is an encapsulating material and preferably one which is stable upon exposure to ultra violet light. In one embodiment the filler material used is of the type commonly referred to as any or any combination of an epoxy gel material, a clear soft gel epoxy encapsulant, or epoxy resin.

In one embodiment the filler material is provided in an enclosed volume defined by the outer face of the display screen, the inner face of the protective panel and a bead or beads of material which form a gasket or gaskets which define the side wall. Typically the gaskets are formed of a material provided in a substantially linear path around the periphery of the protective panel and the display screen.

Typically the depth of the gaskets applied acts to space the protective panel and display screen apart to a set distance and seal the same together to retain and confine the filler material in the said volume prior to the filler material being cured. Preferably, when cured, the filler material has a degree of elasticity to allow limited movement of the LCD screen and therefore prevent distortion of the image on the LCD which may occur due to, for example, temperature change.

In one embodiment, the material used to form the gaskets is a polymer material, preferably of a colour, such as black, to merge with the colour of the display screen.

Typically the display screen is a flat screen with a surrounding metal frame. Yet further, the display screen is typically an LCD display screen with a flexible face which is protected by the

protective panel from damage. The protective panel is preferably manufactured from any suitable material such as glass, acrylic or the like and may be provided for touch screen functionality.

In a further aspect of the invention there is provided a method of forming a display screen structure, said structure including a display screen and a protective panel mounted a predetermined distance in front of the display screen, said method comprising the steps of applying a bead of material to the inner face of the protective panel and/or the outer face of the screen to form a gasket, said gasket positioned around the periphery of the display screen, bringing the protective panel and the display screen together to contact opposing faces of the gasket at a predetermined distance apart and introducing a filler material to substantially fill the volume defined between the inner face of the protective panel, outer face of the display screen and the gasket.

In one embodiment two linear beads of material are provided to form two gaskets.

Typically the filler material is introduced in a fluid state to fill the volume and subsequently cured. In one embodiment the material used to form the gasket is applied in a fluid state and subsequently cured.

In one embodiment the filler material is introduced to fill the volume once the gasket material has cured and sealed the volume. The filler material is then injected through the gasket at one or a plurality of locations, to introduce the filler material into the volume and fill the same. Typically the injection is performed through an aperture formed by the injection means which, when the injection means have been removed reseals due to the resilience of the frame material or additional material can

be applied to the frame to seal the aperture, or the curing of the filler material prevents leakage.

In one embodiment, the quantity of the filler material required to fill the volume of known dimension is calculated and a metering system is provided to monitor the quantity of material entering the volume.

In one embodiment, the depth of the filler material is 3 mm or greater but may be altered to suit specific requirements.

Specific embodiments of the invention are now described with reference to the accompanying drawings; wherein

Figures 1A and B illustrate a display screen structure in accordance with the invention in one embodiment;

Figure 2-4 illustrate the steps followed in a method for forming the structure in accordance with one embodiment of the invention.

Referring firstly to Figures 1A and B there is illustrated a display screen structure in accordance with one embodiment of the invention. The structure 2 comprises a display screen assembly 4 which can be of any conventional design and most typically including a display screen 6 of the flat LCD type as shown, a metal frame 8 and to the rear of the same the control means and cooling means 10 for the structure which can be of any conventional form. To the front of the display screen 6 there is provided a protective panel 12 and the panel 12 is separated from the display screen by a filler material 14 and gasket 16 as shown particularly in Figure 1B which is a cross section along line A-A of Figure 1A.

The gasket 16 and subsidiary gasket 17 between the LCD screen and the frame 8 are formed from a material applied in a fluid state and subsequently cured. When cured, the gaskets define the volume 18 in conjunction with the inner face 20 of the panel 12, the display screen 6 and frame 8. With the volume defined, the filler material 14 is introduced to fill the volume.

Figures 2-4 illustrate one embodiment of a method used to form the display screen structure 2 in more detail. Figure 2 illustrates how in the first instance the material used to form the gaskets 16, 17 is applied around the periphery of the display screen 6 and frame 8 in the appropriate locations. Once applied, the protective panel 12 is brought into position, typically via a jig mechanism, to come into contact with the gasket 16. Sufficient material is applied such that when the protective panel is brought to lie in the required position spaced from the display screen, the gasket contacts the protective panel along the length of the same and hence seals the protective panel 12 with the display screen 6 and frame 8. At this stage the gasket 16 is cured, typically by a suitable curing step and the structure as illustrated in Figure 3 is obtained with the volume 18 defined and sealed and, at this stage, filled with air.

Once the gasket is cured, the filler material 14 is introduced and one method of doing this is illustrated in Figure 4. At this stage the volume 18 is air filled. An injection location 26 is defined in the gasket 16 and a needle or other suitable formed injection means 31 are introduced to form an aperture through the gasket and depend into the volume 18. In addition, an aperture or apertures 27,28 are provided in the gasket to allow the escape of air from the volume as the volume is filled by the filler material.

The filler material 14 is introduced to fill the volume with the technique used being that best suited to the particular

requirements and environmental conditions, but may include drawing a vacuum in the volume, tilting the structure at a particular angle with respect to the injection locations and the like. In any case the aim is to ensure that the volume 18 is completely filled with the filler material and that the generation of air bubbles or other visually detectable flaws are prevented from occurring. The gasket prevents unwanted leakage of the filler material from the volume.

The filler material is then cured, with the curing stage being monitored to ensure that no damage is caused to the display screen or components of the structure.

Once formed, there is provided a display screen structure in which the filler material and gasket material are solid or substantially solid masses and integral with the display screen structure, with the filler material being substantially transparent and the frame material of a colour so as to merge with the colour of the display screen.

The provision of the filler material between the display screen and protective panel, improves the visual appearance of the display screen by the person viewing the same in the direction 30 indicated in Figure 1b by acting to improve the contrast of the display screen and the integral nature of the filler material with the protective panel and display screen means that the problems caused by refraction and/or internal reflection between elements are overcome. Thus there is provided a display screen structure which has considerable advantage over conventional screens, with improved functionality and the same can be successfully integrated into apparatus without the need for any significant adaptation of the apparatus. Further advantages are that there is provided what acts as a one piece construction in front of the display screen which can be of

advantage in touch screen systems, may allow any thickness of rigid protection panel to be used, and generally improves the ruggedness of the display screen structure which is exposed to the user, while at the same time improving the performance of what can be a standard display screen in terms of visual use, without requiring the use or purchase of more expensive display screens.

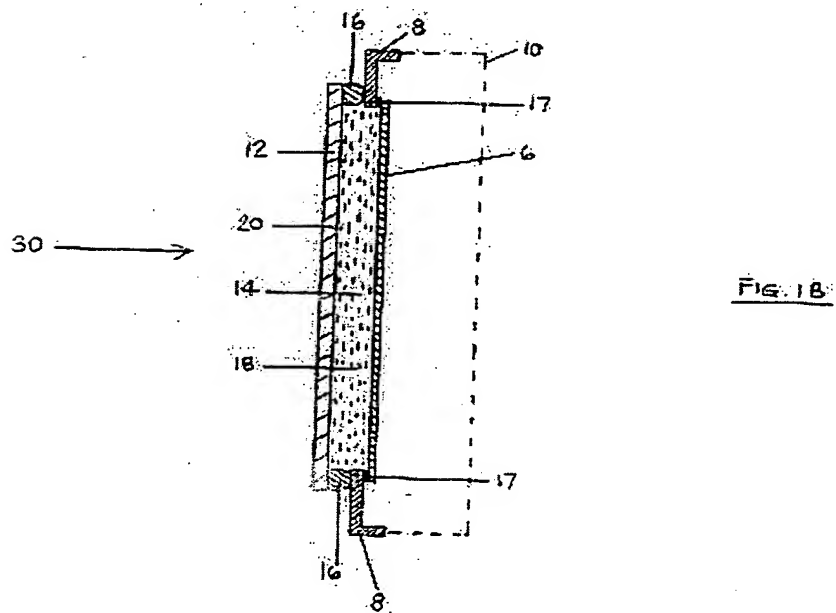
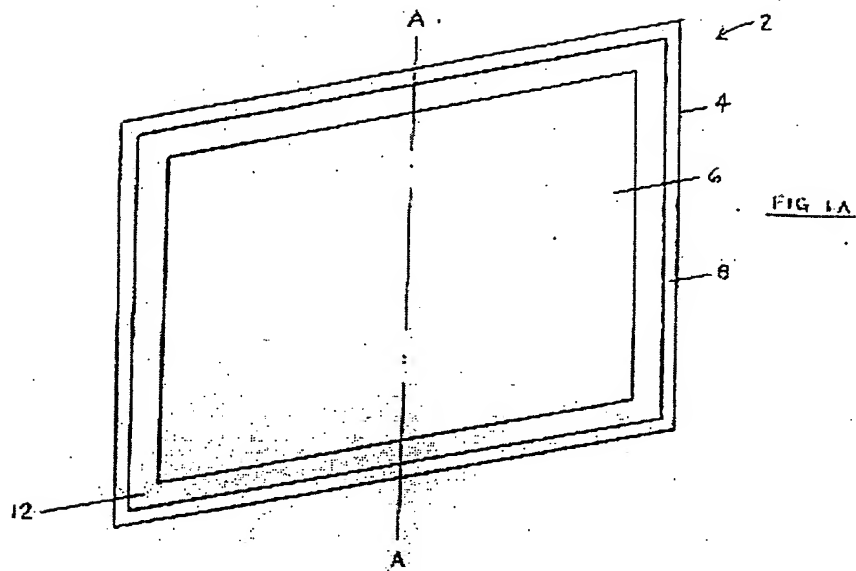


Figure 2

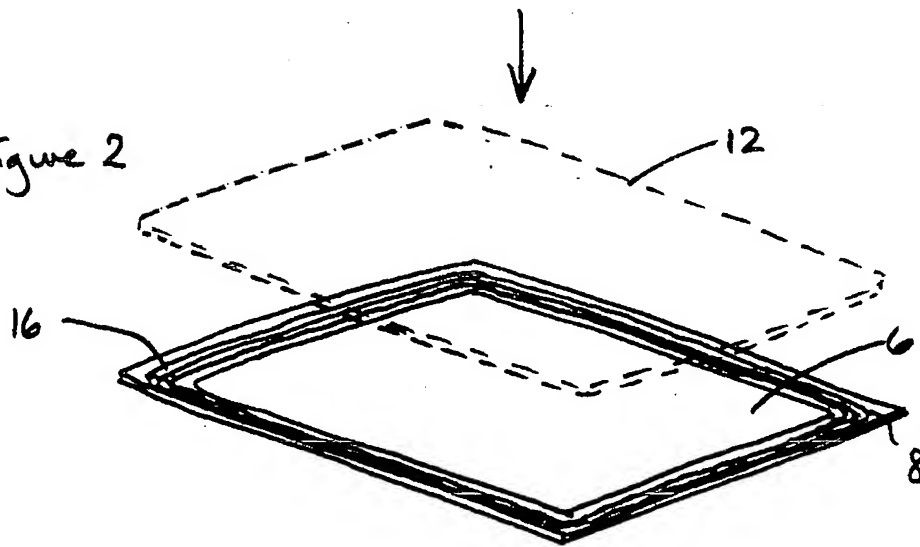


Figure 3

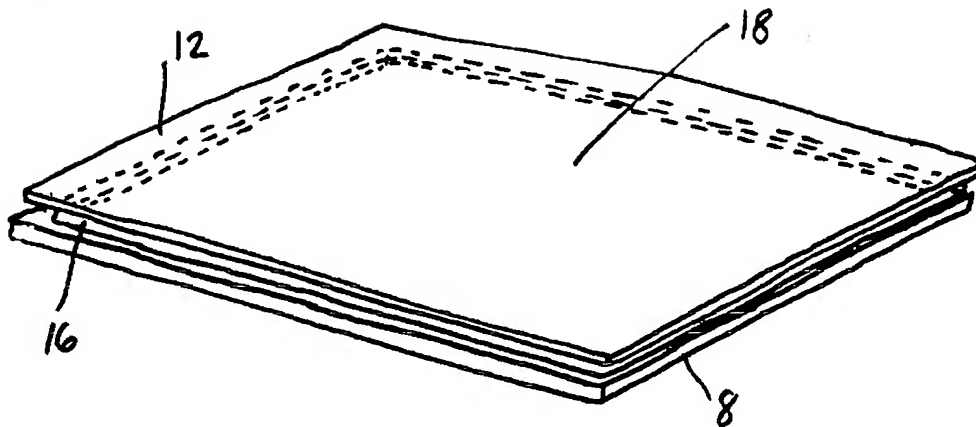


Figure 4

